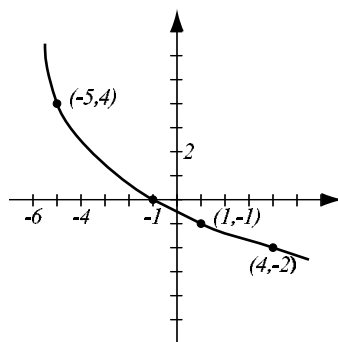


1. (4pts) The graph of a function f is given.

a) Explain why the function has an inverse.

b) Find the graph of f^{-1} , labeling the relevant points.



2. (4pts) Let $f(x) = \frac{3x}{7x - 4}$.

a) Find $f^{-1}(x)$.

b) Find the range of f^{-1} .

3. (4pts) Evaluate without using the calculator:

$$\log_3 27 =$$

$$\log_2 \frac{1}{32} =$$

$$\log_{25} 5 =$$

$$\log_a \sqrt[7]{a^2} =$$

4. (3pts) What is the domain of the function $f(x) = \log_5(x + 4)$?

5. (3pts) Draw the general shape of the graph for these functions. Indicate the x - and y -intercepts.

$$y = a^x, a > 1$$

$$y = \log_a x, a > 1.$$

Solve the equations:

6. (2pts) $\log_3 x = 2$

7. (4pts) $5^{x^2+3x} = 125^{2x+6}$

8. (5pts) Solve and then use the calculator to find the decimal value for x .

$$7^{3x+4} = 5^{2x}$$

9. (2pts) Use your calculator to find $\log_9 0.4$ with accuracy 4 decimal places. Show how you obtained your number.

10. (6pts) Write as a sum and/or difference of logarithms. Express powers as factors. Simplify if possible.

$$\log_4 \frac{(x-2)^6}{16} =$$

$$\ln(e^2 x^{11} \sqrt{2y+3}) =$$

11. (6pts) Write each the following as a single logarithm. Simplify if possible.

$$2 \log x^3 + 6 \log \sqrt{x} =$$

$$2 \ln(x-3) - \ln(x^2 - x - 6) =$$

12. (7pts) One of the radioactive elements released into the air after the accident at Chernobyl (20 years ago this week) was iodine 131, whose half-life is 8 days. The function describing the decay of iodine 131 is $A(t) = A_0e^{kt}$, $k < 0$.

a) Find the k for iodine 131.

b) Livestock feed contaminated by iodine 131 is deemed safe for animal consumption once 10% of the original amount of iodine 131 remains. How long after contamination is it OK to use the feed?

Bonus. (5pts) The probability that a car will pull up to a bank's drive-through within t minutes of 1PM is modeled by the formula $P(t) = 1 - e^{-0.2t}$. Solve the following with accuracy 2 decimal points.

a) What is the probability that a car will come within 5 minutes of 1PM?

b) How many minutes are needed for probability to reach 99%?